

Claims

1. A method of modulating an immune response in an animal comprising the step of administering to said animal a composition comprising
a virus or a cell and further comprising a multifunctional molecule, said multifunctional molecule comprising
a first amino acid sequence which comprises a cell – surface binding moiety
and
a second amino acid sequence comprising a ligand for a cell surface polypeptide of a leukocyte,
wherein said composition comprises said multifunctional molecule bound to said virus or said cell and further comprises some of said multifunctional molecule which is not bound to said virus or said cell.
2. The method of claim 1, wherein said animal is a mammal.
3. The method of claim 2, wherein said mammal is a human.
4. The method of claim 1, wherein said multifunctional molecule is a fusion polypeptide.
5. The method of claim 4, wherein said first amino acid sequence is N-terminal to said second amino acid sequence.
6. The method of claim 4, wherein said first amino acid sequence is C-terminal to said second amino acid sequence.

7. The method of claim 1, wherein said ligand of said second amino acid sequence is chosen from the group: a ligand for a cytokine receptor, a ligand for CD40, a ligand for an adhesion molecule, a ligand for a defensin receptor, a ligand for a heat shock protein receptor, a ligand for a T cell costimulatory molecule, a ligand for a counterreceptor for a T cell costimulatory molecule, a ligand for an opsonin receptor.
8. The method of claim 1, wherein said ligand comprises at least about five contiguous amino acids of a naturally occurring cytokine, said cytokine being chosen from the group: GM-CSF, an interleukin, a chemokine, an interferon, a TNF-alpha, a flt-3 ligand.
9. The method of claim 7, wherein said ligand comprises at least about five contiguous amino acids of a naturally occurring CD154 molecule.
10. The method of claim 1, wherein said comprised cell is chosen from the group: a tumor cell, a bacterial cell, a fungal cell, a cell of a parasite, a mammalian cell, an insect cell.
11. The method of claim 1, wherein said cell or said virus is pathogenic.
12. The method of claim 11, wherein said cell or said virus is attenuated.
13. The method of claim 1, wherein said cell is substantially unable to divide.
14. The method of claim 1, wherein said leukocyte is an antigen presenting cell.
15. The method of claim 14, wherein said leukocyte is a professional antigen presenting cell.

16. The method of claims 14, wherein said leukocyte is a dendritic cell.